# SMITHSONIAN

For members THE MANUEL AND ADDRESS.

# ROBEDWATER

From abandoned fishing nets to old plastic bottles floating debris threatens pelicans and more.

- 125 Years of Science at the 700
- on the Irall of Salamandar
- » Black-Talled Prairie Dog

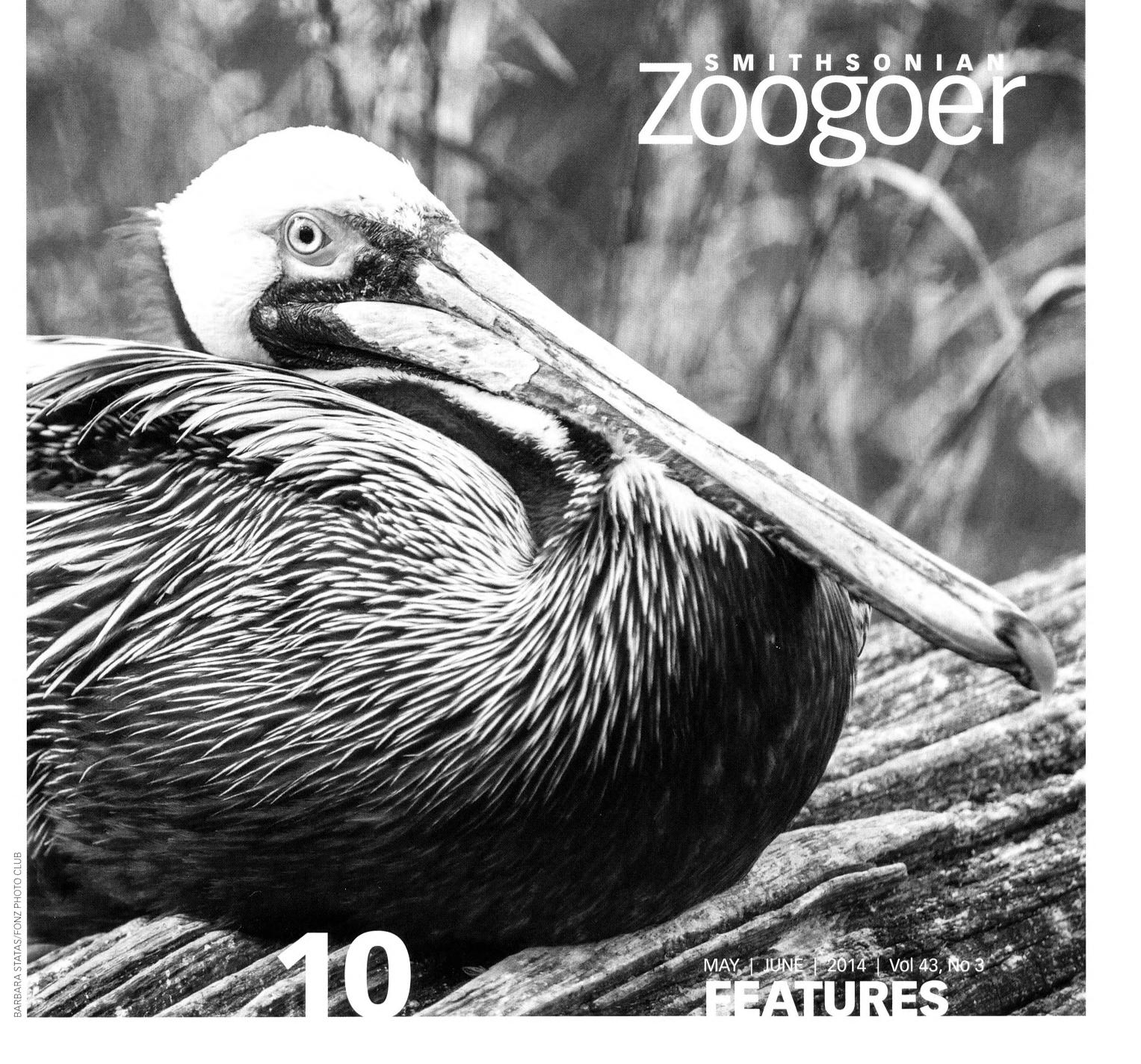


# The price of saving species.

That's right, you can make a difference by drinking beer! When you attend Brew at the Zoo on July 17, proceeds support conservation programs at the Zoo and around the world. Savor pours from 60 craft breweries while enjoying live music, all in the exotic setting of the Smithsonian's National Zoo. **Tickets are available to members first begining May 29 at fonz.org/brew.** So raise a glass for conservation at the National Zoo, where drinking beer not only saves wildlife, it's tax deductible too! *This is a 21+ rain or shine event.* 



JULY 17, 6-9 P.M.



# **Plastics at Sea**

Old fishing nets and household plastic trash create a dangerous stew of debris for marine animals.

BY LISA DUCHENE

# **16** Evolving Science

BY BRITTANY STEFF

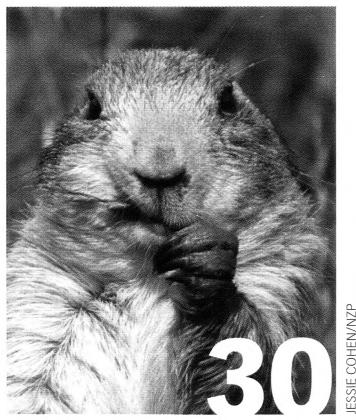
From the moment of its creation, the Zoo was envisioned as a place for species-saving science.

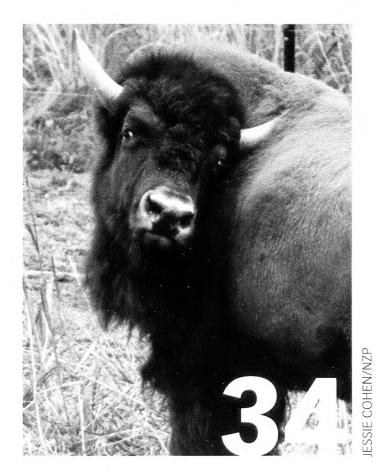
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BY MATT NEFF

A passion for his work with amphibians and reptiles drives one keeper to seek salamanders in their native habitat.









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Passion, dedication, and the desire to make a difference for people, wildlife, and the Zoo.

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Three new Asian elephants arriving soon—will boost the Zoo's herd to seven individuals.

### **Zoo News**

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An update on the bison exhibit, fun programs for children, and a sneak peek at the ZooFari auction.

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One of the Zoo's truly wild residents poses for a stunning portrait.

# SMITHSONIAN Z0080er



is the dedicated partner of the Smithsonian's National Zoological Park. FONZ provides exciting and enriching experiences to connect people with wildlife. Together with the Zoo, FONZ is building a society committed to restoring an endangered natural world. Formed in 1958, FONZ was one of the first conservation organizations in the nation's capital.

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Smithsonian National Zoological Park is located at 3001 Connecticut Ave., N.W., Washington, D.C., 20008-2537. Weather permitting, the Zoo is open every day except December 25. For hours and other information on visiting the Zoo, go to nationalzoo.si.edu.

**Membership** in FONZ supports the animal care, conservation, and educational work of the Smithsonian's National Zoo. It also offers many benefits: a Smithsonian Zoogoer subscription, discounts on shopping and events, discounted or free parking, and invitations to special programs and activities. To join, call 202.633.2922, or visit fonz.org/join.

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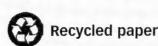
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**Contributing writer:** Taylor Roman-Cohen

On the cover: The Zoo's two brown pelicans are both survivors of past entanglements with fishing line. PHOTO BY JANICE SVEDA/FONZ PHOTO CLUB

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The Smithsonian's National Zoo is accredited by the Association of Zoos



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# "THE TWO MOST IMPORTANT DAYS IN YOUR LIFE ARE THE DAY YOU ARE BORN AND THE DAY YOU FIND OUT WHY."

Mark Twain was full of wit and wisdom, as this quote of his illustrates so well. We are all born into this world, and the lucky ones among us do find out why. We discover a passion, a drive, a reason for getting up when the alarm rings in the morning.

We are extremely lucky here because we—FONZ and Zoo staff and volunteers—work surrounded by this passion. For so many of us, our reason why is right here at the Zoo. We return to work every day because this is where our passion lives, is fed—sometimes literally—and is put to use.

I saw this during my very first week at FONZ, when I was given the chance to observe dental surgery on Mandara, a gorilla. She had a cracked tooth. A full team of staff collaborated to safely sedate and transport her to the Zoo's veterinary hospital, where a dentist performed the operation. It was an amazing experience to be surrounded by so much passion, commitment, and dedication. Although I did not know it at the time, I've since realized that there was nothing unusual about that experience.

From the Zoo's senior scientists to FONZ's newest volunteers, passion for our work is an essential part of our teams' successes. No one can possibly deny the tireless work that went into the creation of the Zoo's science and research programs, the results of which continue to save species around the world today (p. 16). This is why coral biologist and Zoo keeper Mike Henley collects plastic trash on his research dives (p. 10). At FONZ, this is what drives our educators to create new classes and camps every year (p. 32), our board members to donate their time, and our member services staff to answer your phone calls, emails, and questions. It is this passion for the job that Smithsonian archivist Pamela Henson sees when she helps Zoo staff tackle research projects (p. 29). For Zoo keeper Matt Neff, his reason why motivated him to devote his vacation time to seeking out rare salamanders in Virginia and Tennessee (p. 22).

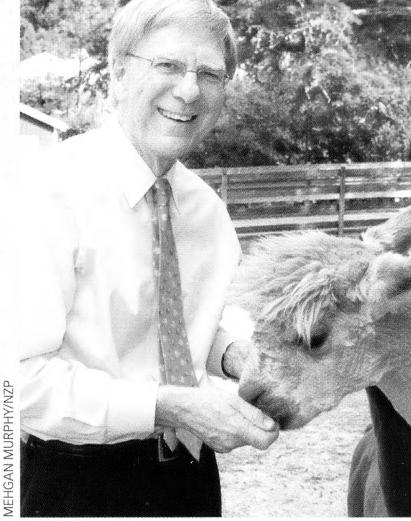
These are the people who work here at FONZ and the Zoo. We are so dedicated to our work here—our reasons why—that we spend our weekends and vacations furthering our work, we leave our research sites cleaner than we found them, and we do it all because we know this is the work we are meant to do. I cannot possibly exaggerate how wonderful it is to work among that passion, and to see its results every single day. Together, with your support, we are making the world a better place for animals and people both. This is our reason why.

Sincerely,

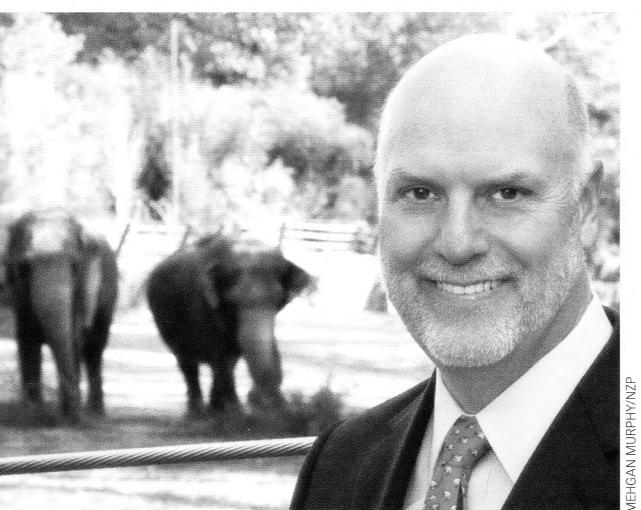
Bob Lamb

Executive Director, Friends of the National Zoo

Bot Lamb



# FROMtheZOO



### TWO THOUSAND MILES NORTHWEST OF WASHINGTON,

keepers at Canada's Calgary Zoo have been rediscovering the truth of an ancient Chinese adage: "A journey of a thousand miles begins with a single step."

For months now, animal care staff there have been training a trio of elephants to step inside boxes. Actually, "boxes" is a bit of an understatement. The containers in question are supersize crates specially designed to transport elephants safely and comfortably. Stepping into them, again and again and again, gets the gray giants ready for the crucial single step of calmly and confidently entering the crates later this spring for a journey to the Smithsonian's National Zoological Park.

The crates—and their immense inhabitants—will travel by truck, accompanied by an elephantine entourage, including animal-transport experts, veterinarians, and keepers from both Calgary and Washington. Two of the three animals are a mother-daughter pair. They will ride aboard the same vehicle, positioned so that each can see, hear, and smell the other along the way. The trip should take 50 to 60 hours. To minimize the pachyderms' confinement, the convoy will stop only when the elephants' care requires doing so.

The new arrivals, all female, will almost double the Zoo's herd of Asian elephants, from four to seven members. Two of them, Kamala and Swarna, were orphans rescued from Sri Lanka. Both were born in about 1975. The third, Maharani, is Kamala's daughter, born at Calgary in 1990. After at least a month in quarantine, the Calgary elephants will be slowly and gingerly integrated into the Zoo's population. When the newcomers go on exhibit, FONZ will offer special opportunities for members to see them; watch your email over the coming months for details.

Why, you may wonder, is Calgary Zoo sending its elephants clear across the continent? The answer, in a word, is science. Recent research on elephants in human care has underscored the importance of giving these intelligent, social animals ample space, varied activity options, and the opportunity to form social bonds.

In the face of those new findings, Calgary came to the hard but wise conclusion that its elephants' welfare required relocating them. That choice is just one of many examples of how the role of zoos has evolved, from providing entertainment to becoming centers of science-based conservation. Another example, of course, is our own magnificent Elephant Trails exhibit, rooted in research and dedicated to housing a herd in the best conditions possible. Our excellent facilities, top-drawer elephant team, and proven focus on conservation both here and in Asia were key factors in Calgary's decision to entrust its beloved behemoths to our care.

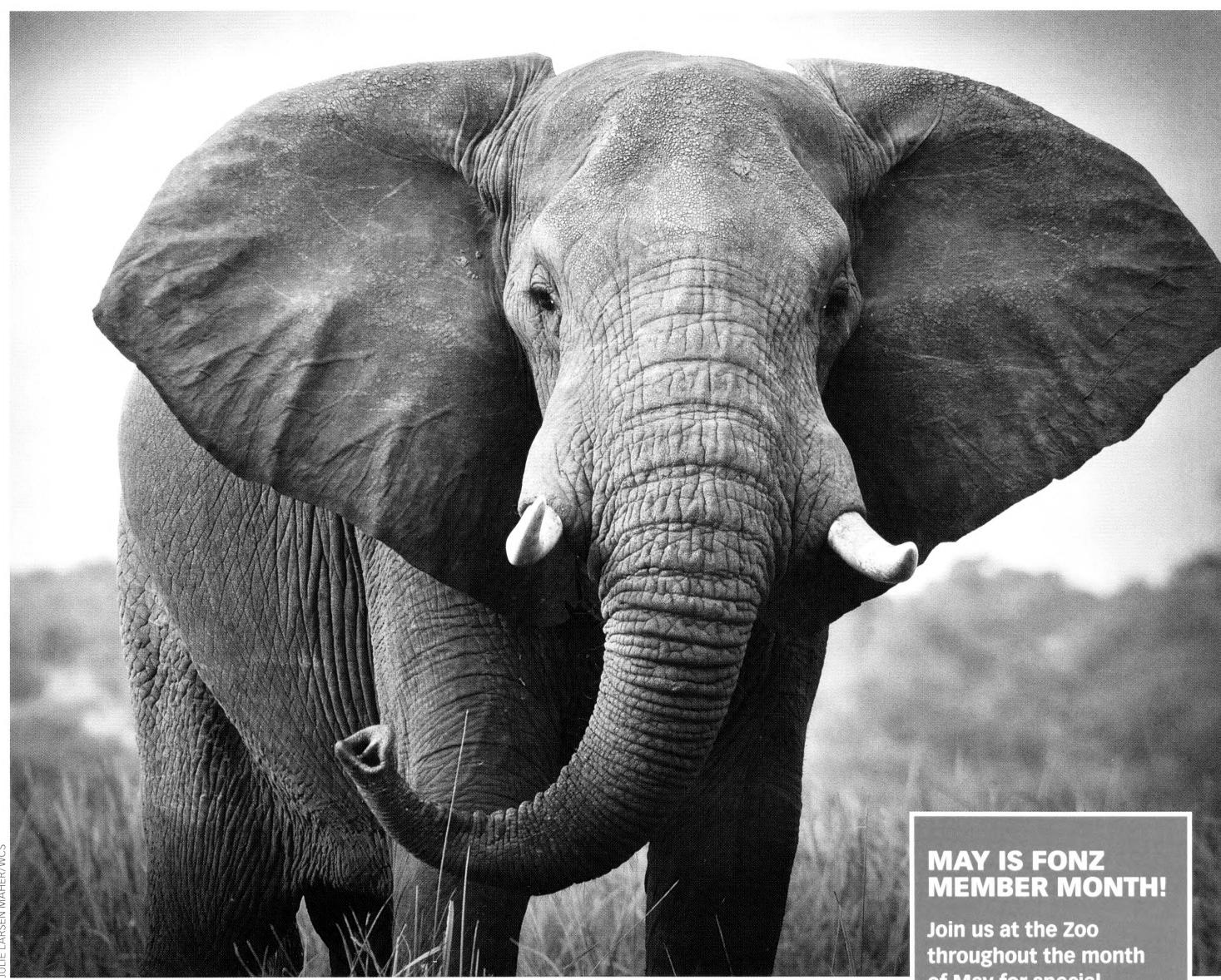
I can't discuss the elephants' arrival without thanking David M. Rubenstein, one of the greatest benefactors in the Zoo's history. His recent gift of two million dollars will cover transporting both animals and people, providing veterinary care, upgrading our facilities, and supporting conservation fieldwork in the wild. My colleagues and I deeply appreciate his generosity, as well as that of the FONZ members who bought commemorative bricks in Elephant Trails and provided the financial support to transport Asian elephant Bozie to the Zoo in 2013. Warmest thanks to you all!

Sincerely,

Director, Smithsonian's National Zoological Park

Nons Kell

# ZOONEWS





96 Elephants In 2012, approximately 35,000 African elephants were slaughtered for their tusks. These elephants—an average of 96 every day—are killed by poachers eager to sell their ivory on the international black market. Since even a single elephant death by poaching is too many, Friends of the National Zoo has signed on as a supporter for the Wildlife Conservation Society's 96 Elephants campaign. This campaign is dedicated to improving elephant protections, strength-

ening ivory moratorium laws, and increasing public awareness of wildlife trafficking and elephant poaching. Here at FONZ, we are proud to be a part of the campaign. We hope you will join us by signing the 96 Elephants petition online: 96elephants.org

of May for special members-only events, activities, and more!

**Spread the word!** 

**Anyone who signs up** as a new member or renews an existing membership during the month of May will receive a special surprise!

Thank you for all of your support.

**More online:** fonz.org/membernews



he Smithsonian's National Zoo is a leader in the fight to better understand, treat, and prevent the spread of elephant endotheliotropic herpesvirus (EEHV), a potentially fatal disease in Asian elephants. Now, thanks to the generous donation of a StepOnePlus qPCR from the International Elephant Foundation, the Zoo's National Elephant Herpesvirus Laboratory (NEHL) is expanding its diagnostic and research capabilities.

The donated StepOnePlus qPCR is one of the most powerful and sensitive gene analysis tools in the field. The speed and power of this new system will allow NEHL to process samples more rapidly than before, test for multiple pathogens simultaneously, and further their research toward better understanding the cause, transmission, and treatment of EEHV.



# TRIO OF GAZELLES

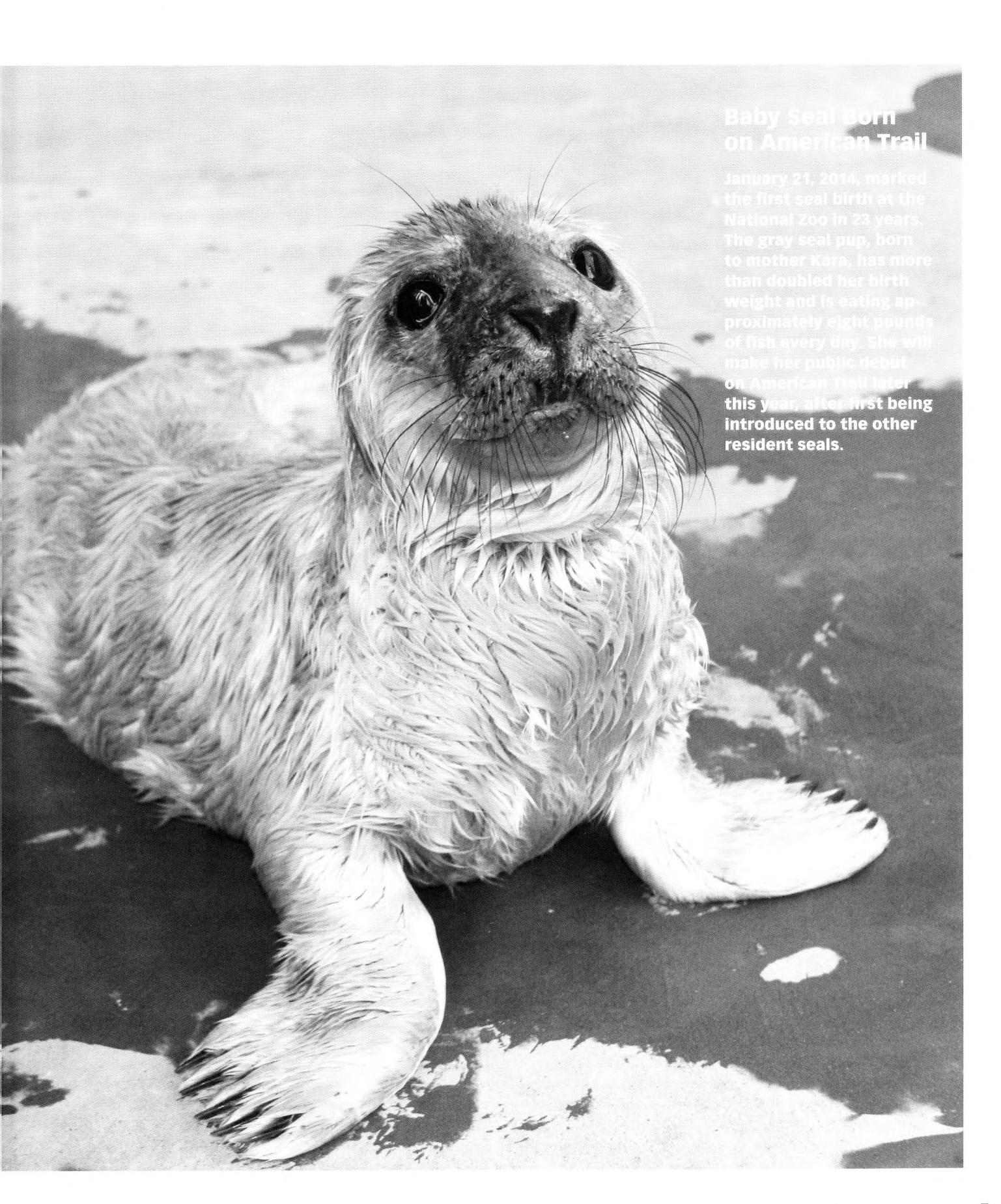
Staff and volunteers at the Smithsonian Conservation Biology Institute are celebrating the birth of three healthy dama gazelle calves. The calves—all males—were born on February 18, 20, and 25. These critically endangered gazelles once ranged across northern Africa, but are now limited to Chad, Mali, and Niger. Fewer than 500 remain alive in the wild. SCBI's research and breeding program provides answers that may ultimately help save this species from extinction.



# 125 Years of Zoo

Over its 125-year history, the Zoo has amassed an incredible collection of stories, artwork, and more. Now, Zoo visitors can get a peek at this history at the new "125 Years" exhibit in the Zoo's Visitor Center. Among its displays, the exhibit includes a photograph of Smokey Bear, a letter from a member of the public, and a reproduction of a mosaic from the Bird House. The exhibit will remain on display in the Visitor Center through 2014.

See page 34 for more about 125th-anniversary events at the Zoo.



# ZOONEWS

# Here, There, and Where?

For decades, black-crowned night-herons have summered at the Zoo. They come to breed and raise their chicks, arriving in mid-spring and staying through the summer. By mid-autumn, they are gone. Where do they go? For years, this question has gone unanswered. Now, thanks to new research from the Smithsonian Migratory Bird Center (SMBC), the Zoo is beginning to piece together the story of these birds' winter habits.

Last August, SMBC and the Zoo's Bird House attached small satellite transmitters to three adult herons. All three birds departed for their migration as expected. Of the three, one lingered in the D.C. area until her transmitter ceased signaling on December 22. The other two traveled south to separate locations in Florida, where their transmitters also stopped signaling one on December 22 and the other on January 14. SMBC hopes to tag and track several additional herons this fall, adding to their knowledge of where and when the birds travel south.





# In Like a Lion

March roared in with the long-awaited birth of four healthy and robust lion cubs to Shera, the Zoo's nineyear-old lioness. This is the second litter for Shera. All four cubs from her first litter, born August 31, 2010, have moved on from the

Zoo to new homes. Sisters Zuri and Fahari (now known as Neema and Kadi) live at

> the Santa Barbara Zoo. Lelia the third female—went to the

**LION CUB PREVIEWS!** Join us for FONZ members-only previews as Naba's and Shera's cubs join the Zoo's pride this spring. Visit fonz.org/membernews for more information, dates, and to RSVP.

Buffalo Zoo with half-sister Lusaka, and John—the only male in the litter—went to the Cincinnati Zoo. Shera's newest cubs bring the Zoo's total lion pride population to nine, including the two cubs born to the Zoo's 10-yearold lioness, Naba, on January 24. Naba's cubs may make their public

debut by late spring, while Shera's cubs will likely go on exhibit about a month later. In the meantime, fans of the big cats can see the cubs' father, Luke, at the Great Cat Exhibit or watch for the cubs and their mothers on the Zoo's lion cam: fonz.org/lioncam.

# **Exploring Careers** in Wildlife Conservation

Students in middle school, high school, and college—and family members—are invited to participate in one or more upcoming career programs, hosted by FONZ. All events are free and open to the public, and will be held at the

Zoo. Although these programs are designed for middle school, high school, and college students, interested students and adults of all ages may attend. Learn more: fonz.org/ecwc

April 27, 1-2 p.m. Training, Animal Behavior, and Enrichment at the National Zoo This program is best suited for middle school and high school students.

Exploring Careers in

Thomas Conservation

Join us for a question-and-answer session with Zoo professionals working in the field of animal behavior, research and training. Learn about some of the incredible research being done at the National Zoo, then stick around to see some of our work in action.

June 26, 5-6:30 p.m. Animal Health at the **National Zoo** This program is best suited for high school and college students. Staff from the Zoo's wildlife health sciences unit and department of animal nutrition will discuss

what it takes to keep the animals at the Zoo healthy. Event is best suited for students considering an animal science or veterinary medicine degree.

September 28, 3-5 p.m. **Meet and Greet National Zoo Professionals** This

program is best suited for middle school students.

Join us for our meet-and-greet program, where students will have the opportunity to speak with professionals from throughout the Zoo. Animal keepers, veterinary technicians, and educators are just some of the experts who will be at this event.

## REASON TO PARTY

It's a celebration! Bao Bao—the Zoo's baby giant panda—turns one on August 23, 2014. To mark the event, Friends of the National Zoo will throw Bao Bao a birthday bash worth remembering. Mark your calendars now for August 23, and come join us for the party.



# Bundle of Joy

On January 6, keepers made the difficult decision to separate sloth bear Khali from her eight-day-old cub. The cub, a female, was the last survivor from a litter of three. For reasons



unknown to keepers, Khali—an experienced mother—had eaten the other two cubs in her litter. Such behavior is not uncommon in the wild, especially if a mother bear suspects a cub is not thriving.

By separating the two bears—and committing to hand-rearing the cub—keepers almost certainly saved the cub's life. She is now approximately four months old, and is thriving. Keepers care for the cub around the clock, and will eventually begin introducing her to the Zoo's other sloth bears as she grows stronger and bolder.

Learn more online: fonz.org/slothbearcub

# Mark Your Calendar

- May 3 Save the Frogs Day—Join us for the world's largest day of amphibian education and conservation action. Learn about the Zoo's amphibian conservation work, meet Smithsonian scientists, listen to keeper talks, and more! Reptile Discovery Center FREE
- May 15 ZooFari-Get your tickets now for the wildest party to hit D.C. this spring! ZooFan features food and drink from more than 100 area restaurants, fabulous entertainment, animal demonstrations, and a silent auction. All proceeds support the National Zoo-thank your fonz.org/zoofari
- Enrichment Day—Find out about the fun and May 31 creative forms of enrichment offered to the animals at the National Zoo, and learn easy ways to keep the animals in your life healthy, happy, and engaged through enrichment at home. Great Meadow. FREE
- Summer Safari Day Camp Begins at the June 23 Zoo-Weeklong sessions include hands-on activities, craft projects, science experiments, and walks through the Zoo. Camps available every week from June 23 through August 15 for children entering grades X-7. Register online: fonz.org/camps
  - FONZ Nature Camp Begins at SCBI-Campers explore and discover local and global wildlife, conservation inhiatives, research programs, and more at the Smithsonian Conservation Biology. Institute in Front Royal, Virgina. One- and two-week sleepover camps available July 6 through August 9 for students entering grades 5-10. Register online: ionz.org/camps
- Brew at the Zoo—Raise your glass to conservation and join FONZ at our annual Brew at the Zoo, where you can sample the best beers from more than 60 craft and microbreweries. All proceeds support the National Zoo-thank you! Tickets available to members starting May 29. tonz.org/brew

# Collisions with Buildings Threaten Birds

recent paper from the Smithsonian Migratory Bird Center shows that collisions with buildings—especially windows—kill an estimated 365 to 988 million birds every year in the United States. Of these, approximately 159 to 378 million birds—44 percent of all fatalities—are killed by collisions with private homes and residences. This equates to an annual mortality of approximately two birds per residence in the United States. Among the birds most frequently affected by building collisions are six migratory species of conservation concern: goldenwinged warbler, Canada warbler, painted bunting, wood thrush, Kentucky warbler, and worm-eating warbler.

Homeowners can help reduce the risk of bird collisions by placing decals on their windows, hanging shades, or avoiding the use of birdfeeders. Learn more: fonz.org/birdsandglass

# From shopping bags to old fishing gear, plastic trash threatens marine animals around the world.

endy and Tinkerbell the Zoo's two brown pelicans—will paddle along the water's surface right up to visitors watching them through the exhibit's glass.

They will eat from their keepers' hands and playfully bop the heads of the passing sea lions who share their home.

What they will never do again is fly.

A tangle of sharp, strong monofilament fishing line ensnared and damaged the ligaments of their wings beyond repair, grounding the pair for life. They were found and rescued along the Florida coast, and came to the Zoo in 2001.

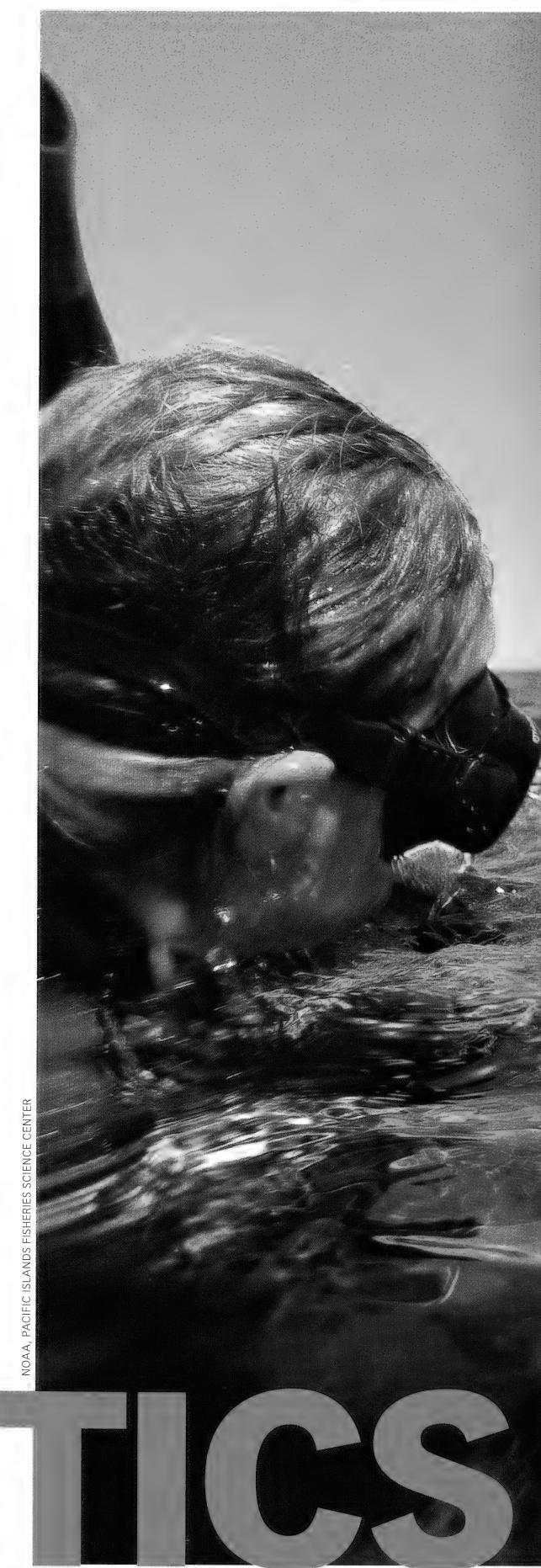
"When birds can't fly, they'll most likely die because they can't find food," says Rebecca Miller, one of the pelicans' keepers on American Trail. "They'll likely drown. They are very susceptible to predators because they have

no way to get away from them. They are susceptible to bad weather. They can't even

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# **PLASTICS** at **SEA**

breed if they can't fly. The male can't get onto the female. He needs healthy, functioning wings for that."

Brown pelicans are the only pelican species that lives in a marine habitat, favoring the fish-rich, inshore waters of estuaries and bays. For the Zoo's two brown pelicans, this distinction became a curse.

### The Plastic Problem

From fishing line to water bottles, marine habitats are increasingly polluted with a buildup of discarded plastic that weathers and breaks down into smaller bits over time, but never really goes away. Production of plastic increases 5 percent annually and another 20 million tons of plastic litter reach the ocean every year, according to a 2013 report from the UCLA School of Law and the Emmett Center on Climate Change and the Environment.

The problem has killed and injured untold numbers of marine animals. The people who rescue these animals and the organizations that house those animals that are unable to live in the wild—including the Smithsonian's National Zoo—are part of a global effort aimed at solving the insidious problem of plastic trash in the oceans.

This effort includes scientists studying the pervasiveness of plastic, and how it may transport toxins, affect the food chain, and ultimately impact public health; volunteers who pick up trash along the beach and pull old fishing nets from the ocean; and those who advocate for policy and legislative changes aimed at preventing plastic from ever reaching the ocean.

The magnitude of the problem first gained global attention in 1997, when Captain Charles Moore sailed into a stew of discarded plastic junk 800 miles north

RIGHT: A National Oceanic and Atmospheric Administration (NOAA) diver removes fishing

FACING PAGE: Sea turtles and other marine animals can be caught and killed by abandoned fishing nets in a process known as "ghost fishing."

PREVIOUS PAGES: Two NOAA divers work together to release a green sea turtle from abandoned fishing gear.

of Hawaii. Scientists now refer to this particular sea of trash as the "Great Pacific Garbage Patch."

Moore sailed for a week through a flotilla of plastic items that stretched for hundreds of miles and was later estimated to be larger than Texas, although it is constantly rotating, moving, and changing.

The National Oceanic and Atmospheric Administration (NOAA) identifies three known spots in the open ocean where small bits of floating plastic accumulate: the Great Pacific Garbage Patch; an area of spiraling currents off the coast of Japan; and the Subtropical Convergence Zone, which tends to force debris to the Hawaiian Islands.

There is little research, says NOAA, on concentrations of marine debris in other spots in the world's oceans. Scientists analyzed 22 years of at-sea surveys in the

western North Atlantic Ocean and Caribbean Sea. They found 62 percent of the samples contained plastic debris.

Since Moore's discovery, researchers have thrown their collective arms around the problem's pervasiveness. "Marine plastic pollution slowly degrades and has spread to every corner of the world's oceans, from remote islands to the ocean floor," says Mark Gold, a co-author of the UCLA report. "Voluntary half-measures are not preventing devastating global impacts to marine life, the economy, and public health."

### Deadly Tangle

The sea of plastic now found throughout the global ocean includes any imaginable household or personal item plus old fishing lines, traps, and nets long lost to



gear from coral.

fishermen but still catching and killing marine animals underwater. This is known as "ghost fishing."

Plastic pieces of old fishing nets and gear found off the Hawaiian Islands, for example, can be as small as your hand or bigger than a huge truck, says Kyle Koyanagi, who has worked in his native Hawaiian Islands for more than a dozen years on spotting, surveying, and cleaning up marine debris for NOAA. Now, he is NOAA's Pacific Islands marine debris regional coordinator, based in Honolulu.

The remote islands of the Papahānaumokuākea Marine National Monument, in the Hawaiian Archipelago, have become a hotspot for ghost fishing. The current, wind, and wave action of the North Pacific Subtropical Gyre often traps debris, which is then transported

along convergence zones in the Pacific to the national monument. The nets, along with items such as light sticks and buoys, are believed to come from all areas of the Pacific Rim.

"It's kind of like—what haven't you seen?" says Koyanagi. "The question almost is: 'What hasn't washed up?'"

Over the years while on the water doing marine debris surveys, Koyanagi learned to spot the signs that he was on the trail of a large, old fishing net that had swept through like tumbleweed, breaking off pieces of itself and ripping off and gathering marine life as it went.

He would see a damaged spot in a coral reef, then another, or a net fragment, then another. "We'd see the path of destruction and eventually know that we'll make a turn and run into the reason," says Koyanagi.

The reason may be a net bigger than a large truck, swollen with dead entangled marine animals and plants, and so big it takes a diving crew many days and dives to cut up a piece at a time and load them all into boats for removal. As they cut twine and tangle, they find animals.

The fishing gear, long detached from its operating boat and crew, still does what it was designed to do: It captures small fishes, which then attract bigger fishes and larger marine animals such as sea turtles. These entanglements affect populations of marine animals around the world, including sea turtles, seals, and whales. Over decades of study, reports on the problem include one tally after another of staggering damage. The images—sea turtles trapped in nets or seabirds strangled by rings of discarded plastic—are heart-wrenching.



# PLASTICS at SEA

The good news in this scene of destruction is that Koyanagi and his NOAA colleagues have pulled many of these nets from the water to prevent further wasteful killings—847 tons of mostly derelict fishing gear from 2001 to 2013.

That's just for the northwestern Hawaiian Islands.

### Trash to Treasure

In 2002, NOAA partnered with Schnitzer Steel and Covanta Energy to launch Nets to Energy, a program to pull Hawaii's derelict nets from the sea and use them to generate power. Schnitzer Steel, a national metal-recycling company based in Portland, Oregon, with a division in Hawaii, transports the nets and uses giant hydraulic snippers to cut the old gear into small pieces, preparing it to be incinerated. The shredded plastic is then shipped from locations throughout the Hawaiian Islands to Oahu, where Covanta Energy burns it in a waste-toenergy facility.

Since 2002, the initiative has gathered and converted 1.6 million pounds—800 tons-of derelict fishing gear into enough energy to power 336 homes for a year.

"Have we made a difference? I can say yes, positively, we have," says Koyanagi. "The only way to make it better is to stop it at its sources. Until it stops at the source, there's almost a job security to it, and that's a bad thing."

Fishing for Energy—a partnership that unites the National Fish and Wildlife Foundation, NOAA, Schnitzer Steel, and Covanta Energy—launched in 2008 to take Hawaii's fishing gear waste-to-energy program to a national scale. Already, the program has installed huge recycling bins at 41 seaports in nine states around the country. Fishermen or anyone who comes across old nets and lines, lobster traps, or crab pots, can drop the gear in these bins for proper disposal, keeping it out of the water.

Since those seaside bins were installed in 2008, 2.2 million pounds of old nets and pots have been collected and converted into energy at Covanta's various regional incinerators, according to NOAA.

"I think that shows fishermen need and want this program," says Dianna Parker,



communications specialist for NOAA's marine debris program. "There is a need out there for places to dispose of nets."

Fishing for Energy is also getting the message out about fishing gear and plastic trash. For example, new Fishing for Energy signage near Wendy and Tinkerbell will share their story and explain the problem of marine debris to Zoo visitors.

### An Everyday Challenge

Commercial fishing is a significant source of plastic marine debris found in the ocean, but it is hardly the sole source. The abundance of plastic in our modern, day-to-day lives—plastic beverage bottles and caps, grocery bags, food wrappers, toothbrushes, utensils—is another large source of pollution.

The annual, one-day International Coastal Cleanup held by the Ocean Conservancy since 1986 provides a snapshot of the problem. During the 2013 event, more than 561,000 volunteers picked up trash along 17,719 miles of coastline around the world.

Their total at the end of the day? More than 10 million pounds of trash.

Mike Henley, a keeper and coral researcher at the Zoo's Invertebrate Exhibit, often dives among the coral reefs off a tiny barrier island along the coast of Belize.

He sees many, many plastic grocery bags and thousands of plastic bottles and other plastic trash "very frequently" as he dives. But most often what he notices are torn-up bits of clear plastic and food wrappers, often the size of coins. "You just look around and think 'My God, you would need a gigantic fish net to come and scoop up all the stuff, and you still wouldn't get it.' You wouldn't get it all," says Henley.

It's disturbing, he says, to dwell on the fact that something like an orange rind he spots on a dive will degrade, but that the plastic pieces won't.

He will spot plastic wrapped around coral and take the time to gently remove it. Otherwise, the ocean current would push the plastic against the coral and rub off the animal's tissue, explains Henley.





LEFT: The Zoo's two brown pelicans, Tinkerbell (left) and Wendy (right), were both rescued from the wild in Florida, where they had been so badly injured by an entanglement in fishing line that they will never be able to fly again.

ABOVE: Marine mammals, such as the wild relatives of the Zoo's gray seal pup (shown here), are among the many animals threatened by entanglement with abandoned fishing gear.

Tens of thousands of individual animals called polyps make up a coral colony, and a plastic-covered polyp won't be able to open and capture food. If left plasticwrapped, that portion of the coral would likely die.

"Anytime I'm diving and I see large bits of trash that I can easily grab, I always grab them and put them in the pockets of my dive gear," says Henley.

### A Deadly Meal

Marine animals also mistake plastic trash such as bottle caps and cigarette lighters for food and eat it. If lucky, they'll pass it through their systems. If not, the plastic can damage their digestive organs or make them feel full enough that they won't eat, causing them to become malnourished or starve. They may also feed the plastic to their young.

"It's fair to say every species of marine bird is affected in one way or another by ocean trash, and plastics are the biggest problem," says Michael Sutton, a longtime strategist in the conservation

community and now vice president of the Pacific Flyway for the National Audubon Society. The problem is not limited to birds. According to one United Nations report, at least 267 different species of marine animals have been documented as suffering from entanglement or ingestion of marine debris.

According to the UN report, approximately 58 percent of seal and sea lion species have been affected by entanglement, with entanglement rates of up to 8 percent within individual populations. In Hawaii alone, there were 268 entanglements of endangered monk seals from 1982 to 2006, according to a 2013 NOAA report. That figure is believed to be an underestimate. An estimated 50 to 80 percent of sea turtles found dead are known to have ingested marine debris, according to the UN. And there are documented cases of marine debris ingestion in about onethird of seabird species. As they forage to feed their young, adult birds pick up plastic trash, which they then regurgitate and feed to their chicks.

### Toward a Solution

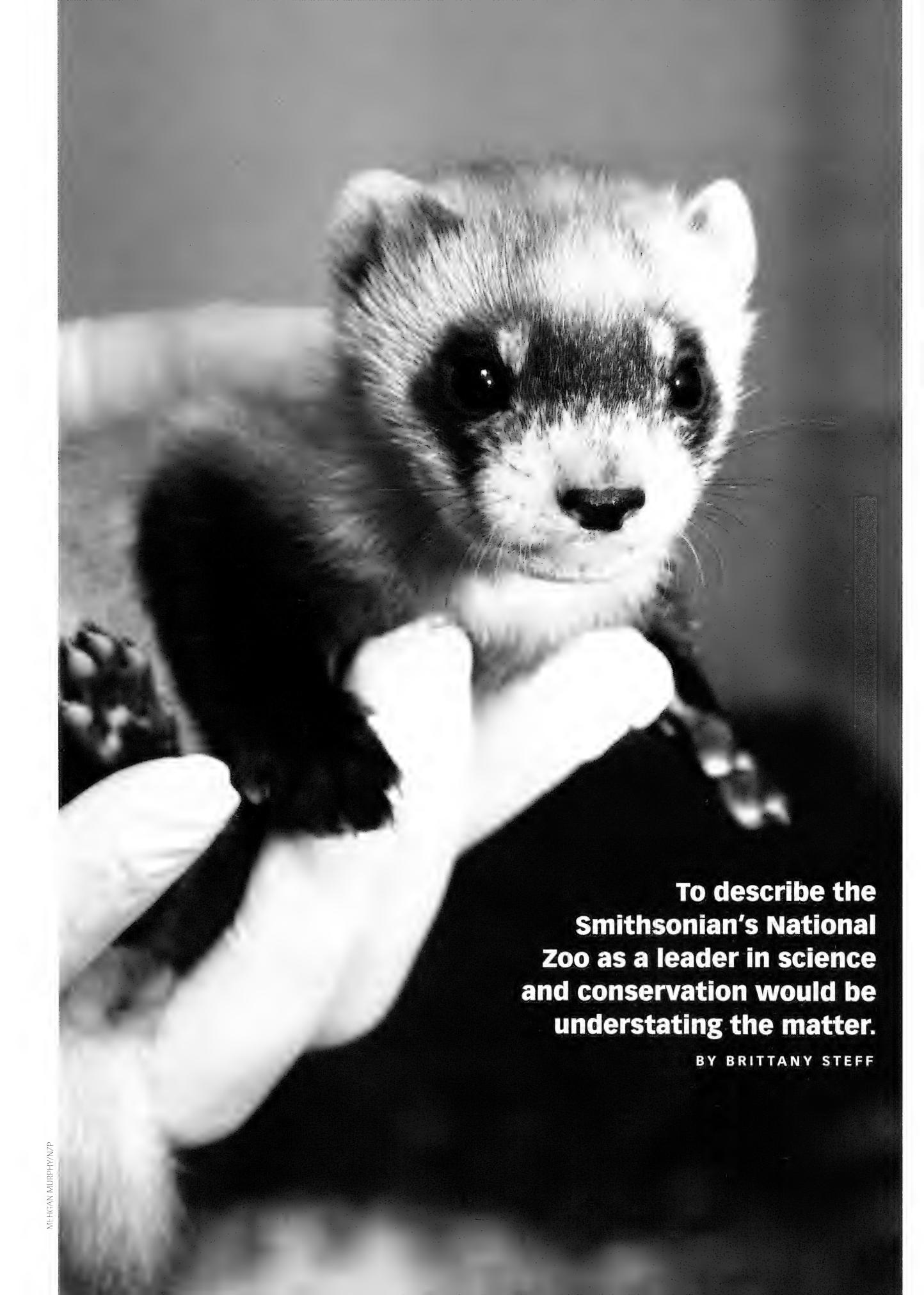
Beyond a doubt, plastic trash in the ocean is a huge, pervasive, and challenging problem. But it can be solved, says Sutton, who is helping advocates work toward a statewide ban in California on plastic grocerytype bags. That would help curb the stream of plastic at its source, he says.

"What we really need to do is stop putting plastic into the ocean and then figure out how to clean up what's there, and those are both huge, ambitious goals," says Sutton.

As scientists, engineers, and conservationists rack their brains to understand and solve the problem, the brown pelicans will live out their days at the Zoo healthy and well, yet forever unable to fly.

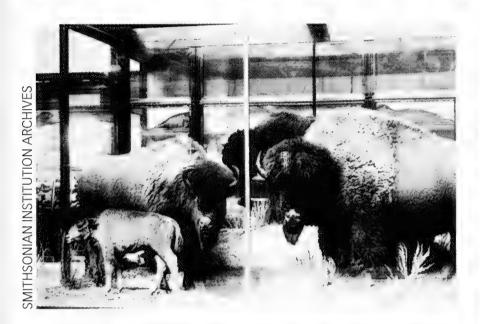
"Wendy and Tinkerbell are living reminders of what abandoned fishing gear and trash and plastic and marine debris can do to wildlife," says Miller.

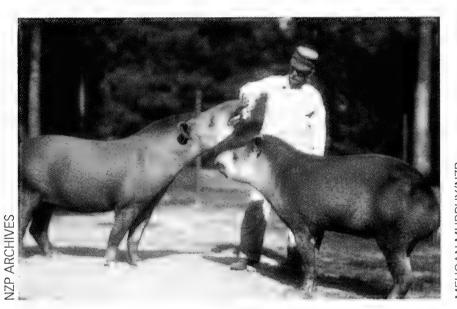
— LISA DUCHENE is an independent science writer and editor with more than two decades' experience writing about marine issues.

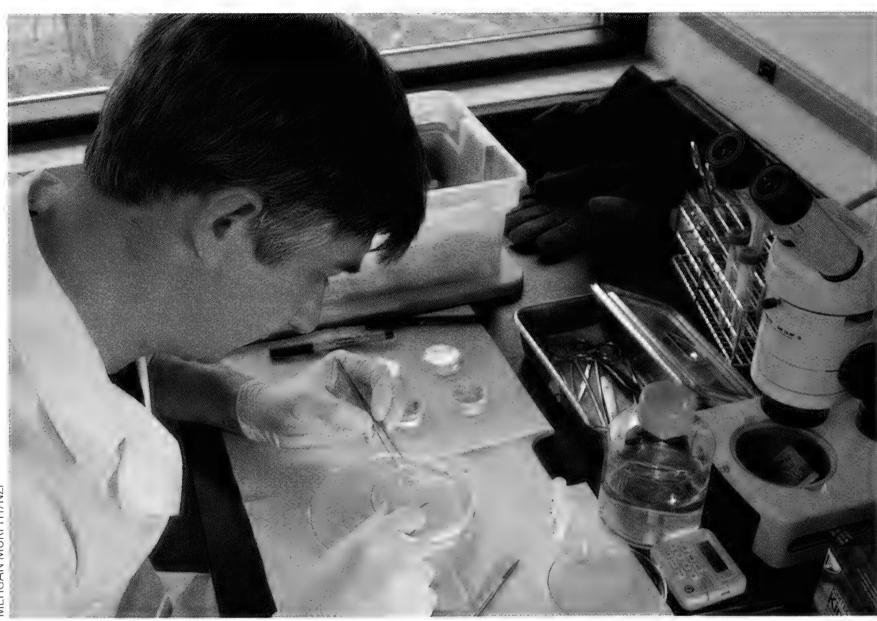


Our third in a series of articles celebrating the Zoo's 125th anniversary.

# EVOLVINGSCIENCE







# YOU COULD SAY that with the Smithsonian's National Zoo, the science was baked right in.

When James Smithson's legacy created the Smithsonian Institution in 1846 its stated mission included "the increase and diffusion of knowledge." Then, when Congress, Smithsonian Secretary Samuel Langley, and Smithsonian taxidermist William Temple Hornaday brought the Smithsonian's National Zoo into existence in 1889, its mission included science even more explicitly.

The congressional act that put the National Zoological Park under the direction of the Regents of the Smithsonian authorized them to manage the park "for the advancement of science" as well as "the instruction and recreation of the people."

Secretary Langley took this order of priorities to heart. He firmly intended to set aside land and buildings at the Zoo exclusively for scientific research though not research you typically associate with a zoo. He wanted an astrophysical laboratory near where the Bird House stands today, for example.

Historically, most of the Zoo's leaders were scientists. Following Hornaday, directors of the Zoo included Frank Baker, a professor of comparative anatomy; Ned Hollister, a curator of mammals from the Museum of Natural History; Alexander Wetmore, an ornithologist; and William Mann, an entomologist.

FACING PAGE: Black-footed ferrets once teetered on the brink of extinction. Scientists at the Zoo led the push to save the species.

ABOVE CLOCKWISE FROM TOP LEFT: The near-extinction of American bison provided the inspiration to create a national zoo with a strong focus on science; Pierre Comizzoli, one of many scientists now studying species reproduction at the Zoo, prepares black-footed ferret tissue samples for preservation in this 2008 photo; Tapirs, shown here in a historic photograph, were the focus of a 2013 research paper by Zoo scientists and others.

# EVOLVING SCIENCE



ABOVE: Ling-Ling with Zoo director Theodore Reed. Giant pandas first arrived at the National Zoo in 1972. Since then, the endangered bears have become the focus of an international partnership between China and the Zoo to better understand the species, improve success with captive breeding, and ultimately increase conservation successes with wild populations.

RIGHT: Zoo biologists Lisa Stevens (left) and Devra Kleiman (right) observe Mei Xiang (in the tree) and Tian Tian at the China Conservation and Research Center for the Giant Panda in Wolong, China, where the pandas lived before moving to the Zoo in 2000.

But leadership was often busy with issues of how to adequately feed, house, and care for the Zoo's growing population on a curtailed budget. While several directors and curators went on expeditions to collect animals for the Zoo—a common practice in the first half of the 20th century—those expeditions weren't motivated by research.

That's not to say that no serious research took place at the Zoo. One of the most important publications in all of mammalogy, Walker's Mammals of the World, was written and published in 1964 by Ernest Walker, assistant director of the Zoo under William Mann. It listed and cataloged more than 1,000 genera of mammals, a feat that hadn't been attempted since 1891.

## An Unbending Reed

The story of rigorous modern research at the National Zoo is the story of people and personalities. That story starts with Zoo director Theodore Reed. Originally hired as a veterinarian in 1955, he was appointed acting director when William Mann retired in 1956 and became director officially in 1958.

Reed is an obscure figure to most of history; he doesn't even have a Wikipedia page. But in the halls of Zoo history, he stands tall. When he assumed leadership of the Zoo, it had a miniscule budget, housed animals in antiquated enclosures, and limped along as best it could. The tragic mauling of a little girl by a lion in 1958 galvanized Congress into giving Reed a bigger budget and inspired the founding of Friends of the National Zoo.

With those funds, Reed improved animal enclosures at the Zoo. But he also had a broader vision. According to Christen Wemmer, former director of the Zoo's Conservation and Research Center (now the Smithsonian Conservation Biology Institute), "we owe a great debt of gratitude to Ted Reed for having the foresight to see that science was an unfilled niche at the National Zoo."



The first step toward filling that niche was hiring zoologist and behaviorist John Eisenberg. Reed hired Eisenberg as the Zoo's first "resident scientist," with the guarantee that Eisenberg could conduct fieldwork overseas as well as at the Zoo.

# The Eisenberg Certainty Principle

Eisenberg was a force to be reckoned with. He immediately began to recruit the best and brightest scientists he could find. "When you draft people for a sports team, you either go for a position player, or just go



for the best people you can find," explains SCBI ecologist Bill McShea. "Eisenberg got the smartest, brightest people he could find and got them on board."

It worked. Eisenberg hired a star-studded cast of scientists, many of whom still lead the conservation world today. These scientists' contributions are so significant that they're impossible to exaggerate. It was a grouping as significant as the Rat Pack, the British Invasion, or the Mercury Seven. It was a grouping that would change history.

Biologist Kathy Ralls helped create the field of conservation biology and proved to a disbelieving zoo world that inbreeding was bad for zoo animals. Devra Kleiman, a reproductive biologist, created revolutionary breeding and conservation programs to save golden lion tamarins from extinction. Gene Morton, world-renowned ornithologist, shaped the modern study of birds. Veterinarian Mitch Bush pioneered the field of zoo and wildlife veterinary medicine and together with pathologist Dick Montali shaped the field of animal care sciences,

developing methods to anesthetize wild animals, vaccinate them, diagnose their illnesses, dose them with antibiotics, and heal their broken bones. Olav Oftedal headed up the Zoo's nutrition program and became a leader in wild animal nutrition research. Ed Gould, a curator of mammals, wrote his own encyclopedia of mammals. Rudy Rudran, a conservation biologist, trained an entire generation of ecologists. John Seidensticker, a world-renowned ecologist, helped set up field studies of tigers in Asia and now directs the Conservation Ecology Center at SCBI.

# EVOLVING SCIENCE





Over the years, the team grew larger. Jon Ballou created the field of small population management. Dave Wildt established the Zoo's department of reproductive sciences. Steve Monfort, hired as a scientist and veterinarian, is now the head of SCBI. Russell Greenberg would become the first head of the Smithsonian Migratory Bird Center, now part of SCBI. Daryl Boness, the first curator of Beaver Valley (now American Trail), now leads the Marine Mammal Commission, an independent federal agency created under the Marine Mammal Protection Act.

John Seidensticker, who studied with Eisenberg in the 1970s, remembers Eisenberg's strong, charismatic personality, which built the Zoo's science program into what it is today. "We wanted to make sure that the Zoo had a science base that was equal to that of any of the Smithsonian museums. That science and research informed how we managed the animals in our collection."

The team of scientists that Reed and Eisenberg assembled were, almost without exception, pioneers and leaders in their fields. They contributed to the founding of the field of conservation biology, the discipline of managing small populations, and made huge strides forward in ecology, behavioral studies, reproductive biology, and veterinary care. That science was not restricted to zoo animals—the Zoo also established field stations all over the world, from Sri Lanka to Venezuela, and Mongolia to Malaysia.

"An important part of the legacy of Zoo science is the cast of characters we had here in the late '70s and early '80s," says Seidensticker. "To this day, the science we do here is pretty incredible."

Multidisciplinary Approach

Reed wasn't adding only animals and scientists to the collection. In 1974, he, Eisenberg, and FONZ collaborated to acquire a 3,200-acre property in Virginia near Shenandoah National Park. It had been a research facility for the United States Department of Agriculture. Reed and Eisenberg had dreams of creating a science oasis, a place where animals could be kept, bred, and studied outside the bustle of Washington, D.C. They called it the Conservation and Research Center.

The facility gave a physical structure to Reed's dream of a conservation and research branch of the Zoo. It had room for a veterinary hospital, paddocks for herds of animals, and housing for scientists to sleep overnight. Wemmer was hired to run the center, now called the Smithsonian Conservation Biology Institute (SCBI).

When Wildt, now head of SCBI's Center for Species Survival, began at the Zoo in the early 1980s, he was given three feet of bench space in a records room, which he shared with veterinarian JoGayle Howard. "In the early days, you were like Jon Ballou studying populations, or you were Devra

Kleiman looking at panda behavior, or you were Dave Wildt looking at sperm quality in cheetahs," says Wildt, who explains that the Zoo's scientists once worked relatively isolated from one another. "In the 1980s, there was a big shift in science to more emphasis on multidisciplinary approaches."

Those multidisciplinary approaches included the addition of a genetics lab and a reproductive lab that evolved into the department of reproductive science. These innovations led to novel ways to ask research questions and address conservation problems.

"We moved from research focusing on specific phenomena or biological traits, to a situation where we were saying, 'We have the last 18 black-footed ferrets on the planet, and we have to study their biology to save them," Wildt says. "That's the kind of interdisciplinary approach the National Zoo is famous for."

During the 1980s and '90s, the scientists at the Zoo worked together to save endangered species from extinction, including the Florida panther, cheetah, clouded leopard, black-footed ferret, golden lion tamarin, and a slew of island bird species.

"That was the beginning of combining captive breeding and small population management with the reintroduction of animals into the wild," says Steve Monfort, head of science at the Zoo. "That was a huge milestone in our development, which



set the standard for our leadership in zoo biology programs."

Then, in 2001, disaster almost struck. Budget shortfalls and changing priorities deemphasized any research that wasn't directly tied to veterinary care of the animals at the Zoo. To save money, the facility would be closed.

Passionate defense—of both science and the Center—saved the Conservation and Research Center. "Calls to save the Center came from around the world," says Wemmer. "Many of these supporters were 'alumni' of Rudran's courses who had lived at the Center, made lasting friendships with peers from other countries, and whose lives had been changed by the experience. I was never more aware of the lasting impact of Rudran's training program." The facility remains open today as the Smithsonian Conservation Biology Institute.

### The Next Generation

Monfort was named associate director of science in 2006, and he formally folded all science research at the Zoo into six centers within the CRC. Then in 2010, the CRC was renamed as the Smithsonian Conservation Biology Institute.

"Science at the Zoo started out along the lines of an academic model, science for science's sake. Discovery was the point," says Monfort. "Now, we're taking discovery to the level of applying science

to solve conservation problems. That's what we do, and that's what conservation biology is all about."

Only a couple of other zoos come close to matching the level of science produced at the National Zoo. A study in 2006 found that six out of the top ten highestproducing scientists working in zoos worked at the National Zoo. Overall, the Zoo's research team has grown from a resident scientist of one to a team that includes more than 37 scientists, 25 fellows, and 37 graduate students.

"The scale of our science is bigger; the quality of our research is better," says Wildt. "In the world of zoos, the Smithsonian's National Zoo has a major commitment to scientific research that most zoos do not. Most zoos simply don't have the resources to devote to the scientific research tradition."

But, according to every scientist interviewed for this story, that's not the zoo's brightest legacy. The National Zoo and SCBI don't just produce the best science; they're also training the next generation of scientists to carry on that research tradition.

"I don't know if any zoo on the planet has graduated as many Ph.D.'s as we have," says Wildt. "Hundreds of people have gotten their masters and Ph.D. degrees doing research with science staff at the Zoo, and gone on to work in management in a range of countries, do research at academic

FAR LEFT: National Zoo reproductive physiologist JoGayle Howard freezes semen in this 2001 photo. Her research led to advances with the captive breeding of giant pandas, black-footed ferrets, clouded leopards, and more.

CENTER: William Blackburne, the first head keeper for the Zoo, holds a young primate in this undated photograph.

RIGHT: Zoo scientist Devra Kleiman observes a golden lion tamarin.

institutions, or lead other zoos." Training programs that began with Rudy Rudran in the 1980s continue to train the next leaders in conservation biology at the Zoo and SCBI today.

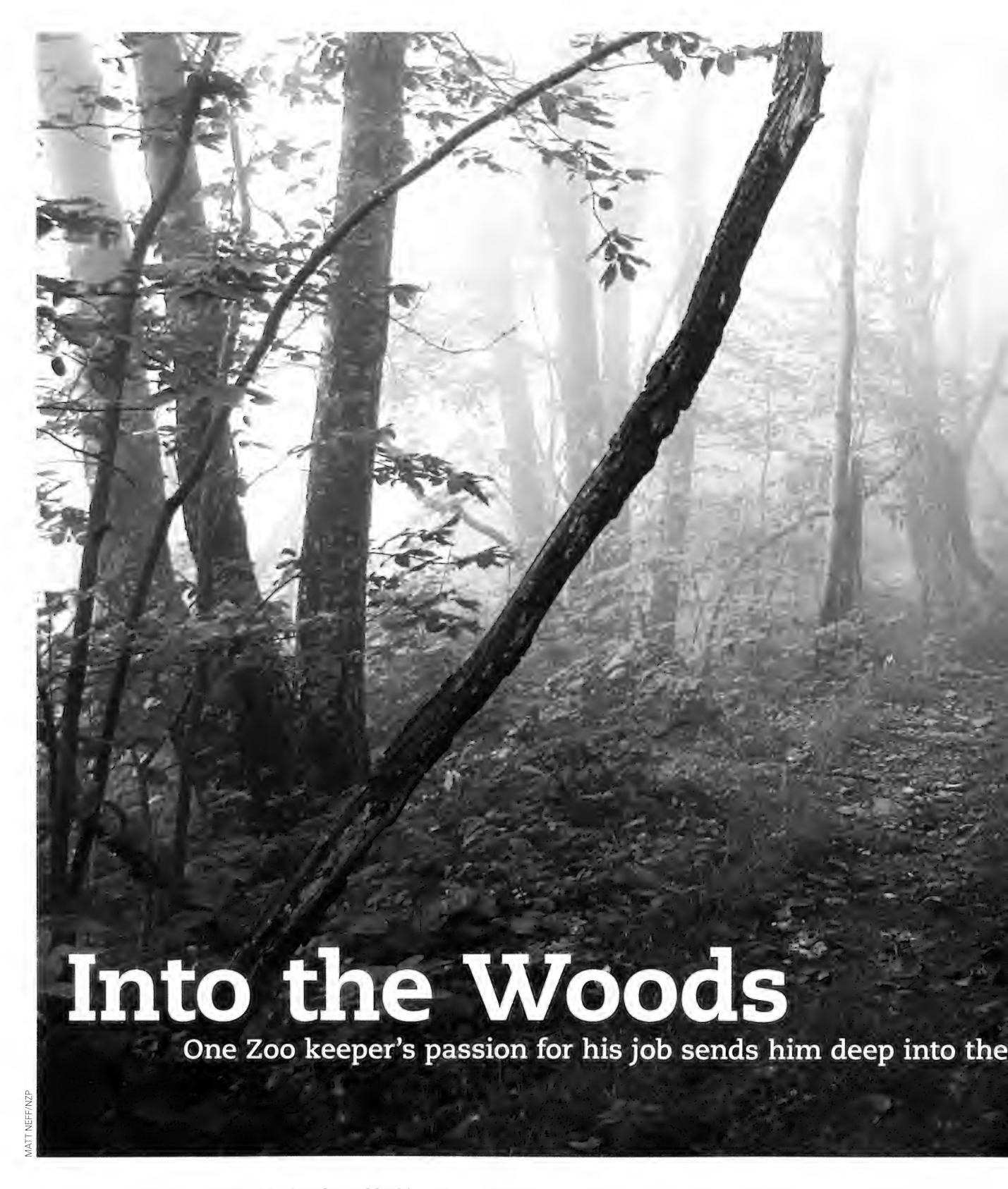
"Rudy's training courses had a huge impact," says Ballou. "I travel around the world today and still meet heads of wildlife departments, university professors, highranking government officials, and other leaders of conservation biology who will ask about Rudy and reminisce about the amazing time they had in one of his courses.

"We are a zoo," says Monfort, "But we are more than a zoo in terms of the scale, scope, and spectrum of things that we do: climate change, training the next generation, captive breeding."

Zoogoers and FONZ members are part of that mission of conservation biology as well. By supporting the Zoo, visiting the animals, and sharing your passion with others, you play an important role in the future of conservation biology.

"When the public looks at the Zoo, they typically see the entertainment of it all. 'What a fun place, what a great way to spend the day," says ecologist Bill McShea, "But the Zoo first and foremost is a conservation organization. Those animals you see are the springboard to real research. There really isn't a reason to have cheetahs unless you're doing something that makes lives better for cheetahs as a whole. The research is here, it's real, and it's making a difference. You should feel good about going to the Zoo and supporting the Zoo because you are supporting this engine that is making the world a better place."

— BRITTANY STEFF is an editor for the Zoo's website and veteran Smithsonian Zoogoer contributor.



Matt Neff was just five years old when he trekked into the woods with his dad and a flashlight. They were on a hunt for wood frogs and spring peepers. Something clicked, and Neff was hooked—he has been fascinated by herpetofauna (reptiles and amphibians) ever since. Now, as a keeper for the Zoo's Reptile Discovery Center, Neff spends his days caring for herpetofauna from around the world. But, in his time off, he sometimes heads back out into the woods for a peek at some of the amphibians and reptiles that can be found closer to home.

Last summer, Neff packed his bags and hit the trails in search of some of the region's most iconic salamanders. Follow along here as he shares his story.



impossible to find in its limited range, I am on a quest to find it. When I drive through Gatlinburg, Tennessee, the temperatures are soaring. A bad sign, I think, as these

# Into the Woods



mountainous salamanders prefer cool, moist habitats. But the temperature drops as the elevation and tree cover increases. When I arrive at the campsite, I see it is already occupied: A female eastern box turtle is busy laying eggs. This has to be a good omen!

The next day, I set out on a five-mile loop trail to find the elusive red-cheeked salamander. A lot of salamanders reside under rocks and moist logs. In flipping a log, I am careful not to disturb animal life—no matter how big or small—living under it. Placing the log back just as it was is crucial to helping any creature that calls it home survive. After 30 minutes of fruitless searching, I start walking along a spring near the trail. I decide to try my luck at finding stream-dwelling salamanders, or "desmogs" as we herpers call them. I have much better luck and the

next ten minutes yield ten salamanders, including several seal salamanders (Desmognathus monticola) and black-bellied salamanders (Desmognathus quadramaculatus), two species I have never seen before. Both salamanders are stocky, brownish-gray in color, and can reach lengths of five to seven inches. Although they are not the species I am after, both are still neat to see. Then a few rocks later, I find a salamander with bright red cheeks. Gadzooks! I have found it! Except, I haven't. Upon closer inspection, I realize I have found the aptly named imitator salamander (Desmognathus imitator). This salamander imitates the redcheeked salamander's coloring because red-cheekeds excrete a noxious mucus. By imitating the red-cheeked salamander, the imitator salamander may gain some protection from predators, which

No more than ten yards in front of me is a black bear. We are both caught off guard and spend a moment staring at one another.

have learned to avoid red-cheekeds. Although it is a fraud, finding this "fake" is a good sign. Imitator salamanders are only found in areas where red-cheeked salamanders live.

I'm now about three hours into my hike. I leave the stream and move uphill to habitat more suitable for the red-cheeked. My next find is a couple of Blue Ridge two-lined salamanders (Eurycea wilderae) hiding under mossy logs. The two-lineds are a slender salamander around five inches long, with yellowish-orange coloring and two stripes running the length of their bodies. At this point I'm about halfway through the hike, and the sun is starting to get lower in the sky. I decide to push on with the hike instead of turning back. It turns out this is the right choice.

The very next log I find looks perfect neither too large nor too small, slightly decomposed, and moist. I roll it toward me and see a dark object dart under the leaves. I carefully scoop it up to see that it's a salamander with beautiful, bright orange cheeks that appear painted on its metallic gray-black body. A red-cheeked salamander! I gently place it on a rock and snap some pictures. Most came out blurry or off center, but I do get one nice sharp photo of it climbing up the rock. Finished with the photo shoot, I roll the log back and place my prized salamander near its home.

Onward, I clamber under a grove of mountain laurels in bloom. The sun is now going down fast, so I pick up the pace. Walking as quickly as I can without slipping on the trail, I hear a grunt and stop dead in my tracks. No more than ten yards in front



: Red-cheeked salamanders' brightly colored cheeks are a warning for predators. The salamanders excrete a foul-tasting mucus when threatened.

- AT: Seal salamanders are found near streams and moist areas in the eastern United States. FACING PAGE: A gray-cheeked salamander.

of me is a black bear. We are both caught off guard and spend a moment staring at one another. Then the bear heads off, perhaps in search of food. I cautiously press on, making sure to check behind me every few seconds. It is a good 15 minutes before my heart rate settles down. What an end to the day!

I spend the next few days in the Smokies, exploring a bit more. Then, I head up to southwest Virginia in search of the very large Yonahlossee salamander.

June 29, 2013: Southwest Virginia As I start the trek back home to D.C., I stop in southwest Virginia to find the Yonahlossee salamander (Plethodon yonahlossee). The Yonahlossee is in the same

genus as the red-cheeked salamander: Plethodon. Most salamanders in that genus are about four to five inches long and slimbodied, but the Yonahlossee can get up to almost nine inches long, with a chunky girth. I arrive at my campsite in the late afternoon, and prepare to embark the next day to look for the Yonahlossee.

The next morning, I choose a three-mile loop trail not too far from my campsite. Although the elevation is about 2,000 feet higher and the temperatures are cooler, the habitat is very much the same as the Smokies, with plenty of seeps and moist ravines to be seen.

The first salamander I find is under the third log I flip. Although it isn't the



# Into the Woods



The author holds a Yonahlossee salamander after finding it beneath a log. These are among the largest terrestrial salamanders found in the Appalachian Mountains.

Yonahlossee, it is a species I have not seen before—an Appalachian Mountain dusky salamander (Desmognathus ochrophaeus). What's neat about this species is that unlike other desmogs, they can be found some distance away from streams and seepages. They are a modest four inches long with a beautiful bronze-orange back and dark brown sides. A few logs away, . I find a salamander that I will see plenty more of—the gray-cheeked salamander

(Plethodon montanus), a close cousin to the red-cheeked salamander.

Over the next 30 minutes, I find more black-bellied, gray-cheeked, and Appalachain Mountain dusky salamanders, and even see an American toad hopping across the damp trail. I start heading downhill and hear a stream in the distance. Then I peer under a promising log and see a flash of chestnut red. Is it a Yonahlossee? I gently pick it up and see that indeed it is a Yonahlossee! Although it is not as big as they can get, it is still a respectable five to six inches. The colors on this salamander are captivating; its auburn back contrasts with its metallic gray-black body and

blue-gray flanks. I gently roll its log back in place, and set the salamander down before moving on.

I am now at the lowest point on the hike, walking along a rushing stream with blooming rhododendrons and mountain laurels hugging its banks. I lift a log beside the trail and almost fall over. A huge Yonahlossee! I take a few pictures and gently "measure" the salamander with a stick. Later, I measure the stick and discover the salamander was 8.5 inches long—the largest salamander of this trip and only 0.2 inch shy of the Virginia state record.

The high from finding the huge Yonahlossee wears off as I start the

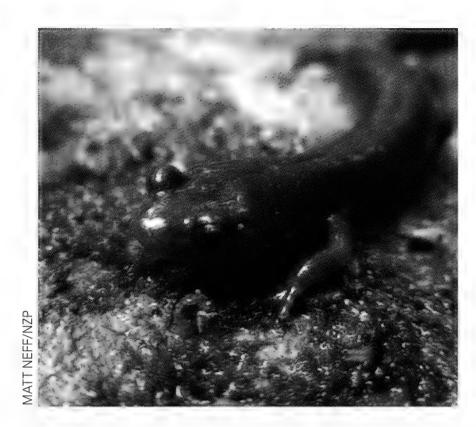
exhausting uphill journey back to camp. The trail is steep, but I continue to look for salamanders where possible. Not to any surprise, I find a couple of smaller, graycheeked salamanders. I also find another species—a pygmy salamander (Desmognathus wrighti), which is a great contrast to the large beast I found earlier. This pygmy salamander has a darker brownish-copper body with a golden chevron pattern down its back. These miniature salamanders reach a maximum size of two inches and apparently have more energy than any of the other salamanders I found on this trip. I find 11 in total, and every one jumps, darts, and rolls when I try to take photos.

July 20, 2013: Shenandoah, Virginia After my successful trip in June, I decide to head out with a friend to find the vulnerable Shenandoah salamander (Plethodon shenandoah). The easiest thing about finding this salamander is its proximity to D.C.—they are found on only three mountain peaks in the world, and all are less than a two-hour drive from the city. Such a limited habitat contributes in part to their vulnerable status.

We start our hike in the late morning. The sky is clear; it looks like a great day for salamanders. Starting out, we walk past several seeps and springs, and see many seal salamanders, like those I had seen in Tennessee. Moving uphill, we see the first of about a dozen white-spotted slimy salamanders (Plethodon cylindraceus). They are a larger salamander species that can get to almost seven inches, with white freckles dotting their black backs.

Making our way to the peak, we hear thunder in the distance. The sky is clear, so we're unconcerned and continue our salamander search. We find a few dozen redbacked salamanders (Plethodon cinereus). These are the most common salamander species in the eastern United States—I even found a few in my yard as a kid in Arlington, Virginia. They are so plentiful that their total biomass (the combined weight of all red-backed salamanders) outweighs that of many species of birds and small mammals in eastern forests.

When we reach the summit, we are rewarded with beautiful views of the







FROM TOP: Shenandoah salamanders are found on only three mountains in the world, and all are within Virginia's Shenandoah National Park; a slimy salamander; the view from the top of the mountain on Neff's July 20 hike.

valleys below and the storm clouds that are approaching—fast. Within a few minutes we feel raindrops. I suggest we seek shelter in a nearby pavilion, and we do. Good idea. We enter the pavilion just as the downpour begins. I don't think I have ever experienced a storm this heavy—it even starts to flood the pavilion. For the next hour we wait for the rain to stop, discussing the animals we've seen, the animals we still want to see, and yawning a lot. Finally

the rain starts to lessen. Although it's still raining, we decide to make a move. We aren't headed back to the car; we are hiking onward in search of the salamanders that we have come to see.

The rain finally ends as we reach the other side of the mountain. The terrain changes drastically too, with steep slopes on either side of the trail. We lift our first rock—in the middle of the trail—and one salamander sits up much prouder than the rest, raising its broad head. It is a Shenandoah! Like the red-backed salamander, the Shenandoah salamander comes in two color phases. They can be black with a narrow red-to-peach stripe down their back, or they can be all black. This one is all black. Ultimately, we find 15 more Shenandoah salamanders. Pretty amazing for a salamander that has such a limited range. Soaking wet and pleased to have found the Shenandoah salamander, we turn back to the car. It has taken us a good three hours, not including our rain encounter, to reach this point. Walking back takes less than 45 minutes, because we aren't taking the time to flip logs and find salamanders. Soaked, tired, and happy, we make the drive back to D.C.

### One Great Summer

Writing about these trips, I realize how lucky I have been. I found the animals I set out to see, and also ended up seeing many others as well—some that I had never seen before. It feels as if I've come full circle: first as a kid hiking with my dad looking for reptiles and amphibians as a hobby, to this career working with the very animals that enchanted me as a child, and now back into the woods again.

Like those early hikes with my dad, these salamander expeditions were just for fun. I set out to find salamanders in places I had never visited before, and was lucky enough to find them. It is heartwarming to realize that, even though amphibians are vanishing from this Earth at alarming rates, some can still be found and seem to be doing very well in locations close to home. This gives me hope.

—MATT NEFF is a keeper for the Zoo's Reptile Discovery Center.

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# BEAST BITS

# Tiny and Toxic

Blue poison dart frogs are beautiful but deadly. Their colorful skin contains one of Earth's deadliest toxins. Some species are so toxic that a single frog can kill multiple mammals, even humans. Hungry predators learn to avoid the frog's

bright colors, ensuring both predator and prey live another day. Hop over to the Reptile Discovery Center or Amazonia to see the Zoo's blue poison dart frogs.

Many animals use spots and stripes as camouflage. Their strong pattern makes it harder for other animals to see them in sun and shade.



# Invisibility Ink

Any predator that startles a cuttlefish may be rewarded with a face full of ink. When they feel threatened, cuttlefish squirt out blobs of ink before jetting off for safety. The ink makes it difficult for hungry predators to see or smell them, which helps the cuttlefish escape. Squirt on over to the Invertebrate Exhibit to see the Zoo's cuttlefish.



# SAVINGTHESTORIES

Take amazing animals. Add colorful characters who look after them. Multiply by 125 years of National Zoo history. Result: a host of great stories. Historian Pamela Henson gathers and preserves them.

love coming to work each day," Henson says. And for 40 years now/she's worked in the same place—the Smithsonian Institution Archives. Henson started at the Archives in 1974 as an assistant to the oral historian. That's someone who interviews people about their experiences.

Over the years, Henson has talked and listened to countless Zoo employees—directors, animal keepers, scientists, and more—as well as volunteers and visitors. She's collected stories both in Washington, D.C., and Front Royal, VA. Probably no one on Earth knows more about the Zoo's history.

Henson ultimately came to lead the team charged with charting the Smithsonian's own story. Their work involves careful record keeping, cataloguing pieces of the collection, preserving fragile items, writing, lecturing, helping researchers, creating online tools and exhibits, and many other tasks.

### Wild Woman

One of Henson's favorite oral history projects was a series of conversations with Lucile Quarry Mann. She was a writer, an editor, and the wife of longtime Zoo director William Mann. He led the Zoo from 1925 to 1956, and Mrs. Mann was an active partner in his work. She also worked as the Zoo's editor from 1951 to 1971.

Together the Manns (inset photo) traveled the globe to collect animals for the Zoo. They trekked into thick jungles, paddled along mighty rivers, and explored remote, tropical isles. As they gathered creatures, Mrs. Mann looked after the



growing, traveling zoo. One time, aboard a train, she feared that the live snakes she was carrying might frighten other passengers. So she hid them in a bag under her skirt! (Today zoos seldom collect animals from the wild.)

The Manns often brought their work home—literally. Mrs. Mann loved raising lion and tiger cubs, and she always hated when the time came to return the growing cats to the Zoo. She also tended their collection of live snakes. (Nowadays, drawing on the newest science, zoos try to let animal parents rear their young.)

### **Passion and Problem-Solving**

Thinking about Zoo history, Henson says two themes really stand out. One is the amazing passion Zoo employees have for their work. The other is the ability of Zoo staff to find creative solutions to problems.

Perhaps the most striking example of a dedicated employee was the first head keeper, William H. Blackburne. He was a true "animal whisperer," Henson says, able to calm and care for just about any creature. He worked at the Zoo for 53 years, retiring at 87. In all that time, he never took a day off.

During the 1930s, Zoo staff, like all Americans, struggled to cope with the Great Depression. Money was tight, and feeding the animals became a challenge. So keepers got creative. Each day, they visited grocery stores, gathering up leftover food that would otherwise be thrown out. That's just one example of clever solutions to problems.

From snakes on a train to leftovers on the menu, the Zoo's history is one great story after another. Each is a treasure for Henson and those she helps. She says simply, "I love it all."

— PETER WINKLER

# CREATURE EEATURE

Black-tailed prairie dogs

We see that the s

# PRAIRIE Construction

# Dog or SQUIRREL?

We call them "dogs," but prairie dogs are really a type of squirrel. They get their name from their alarm call, which sounds like a high-pitched dog bark. Prairie dogs grow 14-17 inches long and can weigh up to three pounds. They usually live for three to five years.

## **BIG-TOWN** Life

Prairie dog towns are really a network of underground tunnels that connect sleeping chambers with entrance holes. A single town might cover 100 acres or more, and may house thousands or millions of prairie dogs.

# **Gity MANAGERS**

Scientists call black-tailed prairie dogs a "keystone species," because they have such a large impact on the land where they live. Prairie dog towns provide homes for many different kinds of animals, including burrowing owls, badgers, black-footed ferrets, and more.

# MEET and Greet

People often greet friends with a hug or a handshake, but prairie dogs kiss to say "hello." But they aren't really kissing. Instead, they are pressing their big front teeth together. This is how prairie dogs recognize one another.

# All in the FAMILY

Every prairie dog town is divided into smaller neighborhoods, called "wards." Several prairie dog families, called "coteries," live in each ward. Most coteries consist of a single adult male, several adult females, and any offspring that aren't yet old enough to breed and form their own coteries.

BY CRISTINA SANTIESTEVAN 



# WATCH Duty

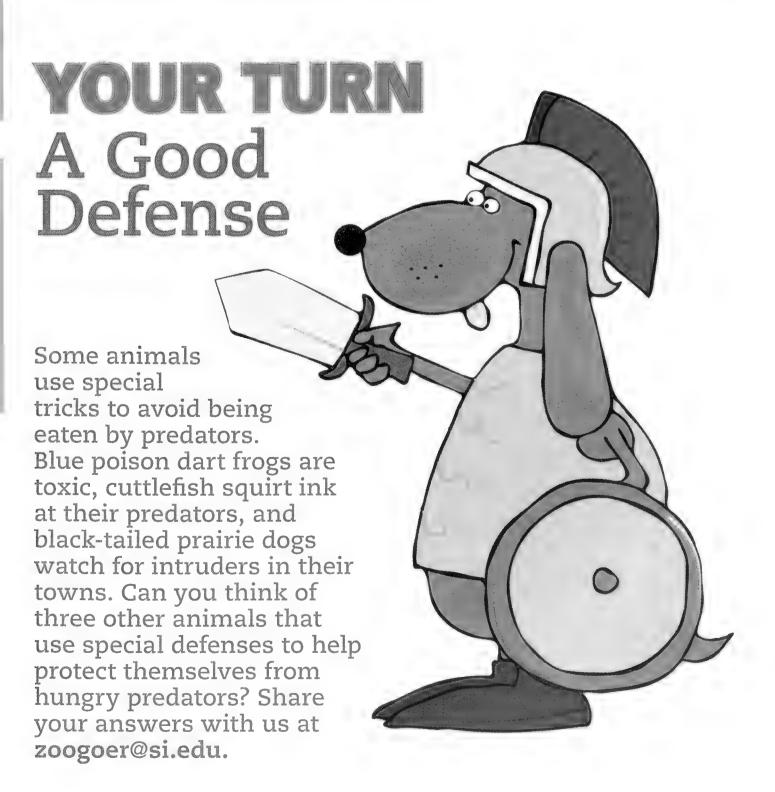
Many animals eat prairie dogs, including black-footed ferrets, coyotes, and golden eagles. To keep safe, a single prairie dog often stands sentry for every coterie, and will alert its family with a chirk-chirk alarm call if danger is spotted.

## Valuable HOUSING

Prairie dogs are not endangered, but black-footed ferrets are. In fact, black-footed ferrets are one of the most endangered mammals in the United States, and they only live in prairie dog towns. By protecting prairie dogs, scientists help save black-footed ferrets from extinction.

# AT the Zoc

Pay a visit to the Zoo's outdoor black-tailed prairie dog colony near Lemur Island.



# FONZ

# **FONZ RESOURCES**

fonz.org

Member/Donor Information 202.633.2922

Special Events 202.633.4470

Corporate Events 202.633.3045

Camps and Classes 202.633.3024

Volunteer Services 202.633.3025

Comments? Questions?

Please email us at fonzmember@si.edu

Not a FONZ member yet? Call 202.633.2922 or go to fonz.org/join

# **FONZ Classes**

ur teachers are real bears—and lions and otters and owls! Students learn about animals, science, and conservation through hands-on activities, crafts, and tours around the Zoo.

Classes do not include behind-the-scenes visits or direct contact with animals, but do use touchable artifacts (pelts, bones, feathers, etc.).

Children must meet the minimum age requirement by the date of their first class. Unregistered children may not attend, with the exception of non-crawling infants.

Register online: fonz.org/classes

# Weekend Family Programs

Fun for the whole family! Attend individual class sessions, or register for the whole series. At least one adult must be present for every two children per group registration.

# MEMBERS SAVE 20%!

# Use discount code

when registering to claim your 20% member discount!

MEMBER: \$28 NON-MEMBER: \$35

Register online: fonz.org/classes

# Curious George Goes to the Zoo!

Curious George loves to explore, just like the golden lion tamarins. We'll learn about these mischievous little monkeys in the Small Mammal House.

AGES: 2-3
TIME: 10-noon
DATE: May 3

### **Marvelous Mothers**

Celebrate Mother's Day at the Zoo! Bring your mom or grandma to visit some of our Zoo mothers and learn about the ways animals keep their babies safe. Then, we will make a special gift for the mom in your life.

4-8 (May 11) 9-12 (May 10) **TIME:** 10-noon **DATES:** May 10; May 11

AGES: 2-3 (May 10)



### Choo, Choo at the Zoo

All aboard for a journey across the American Great Plains! Make tracks and discover facts as we learn about the amazing animals we'll see outside our train windows. Includes a ride on the Speedwell Conservation Carousel.

AGES: 2-3 TIME: 10-11:30 a.m. DATE: May 17

# The Lion King

Roar into summer with the "pride" of the Zoo. Celebrate the Zoo's new lion cubs by learning about Simba, Nala, and their wild pals!

Fee is per individual class.

AGES: 4-8
TIME: 10-noon

DATES: May 18: Timon and Pumbaa
June 1: Zazu the hornbill

June 8: **Simba, Mufasa, and** 

the lion pride





### **Fantastic Fathers**

We've got some proud papas at the Zoo! Bring your dad or grandpa to meet them and learn about how animal fathers protect their pride, pack, herd, or troop. Then, we will make a special gift for the dad in your life.

**AGES:** 2-3 (June 14) 4-8 (June 15)

TIME: 10-noon

9-12 (June 14)

DATES: June 14; June 15

# And the Opening Bid Is...

et ready to bid for artwork, vacation packages, special behind-the-scenes Zoo tours, and more with the exclusive ZooFari silent auction and online auction. All proceeds from the auctions support the Zoo's programs to save species in their natural habitats and here at the Zoo.

### ATTEND ZOOFARI TO BID

The silent auction is open to all attendees at ZooFari. Come join us for a night of delicious food, tempting drinks, and access to our exclusive auction. Register online: fonz.org/zoofari

make ZooFari this year? You can still place a bid for one-of-a-kind art, tour packages, and more in the ZooFari online auction, April 27-May 18.

Bid online:

fonz.org/2014auction

many amazing auction items to list here. Join us for ZooFari and log on to the auction website to see all the items up for auction (note: some items are available only at the ZooFari auction).

- Behind-the-scenes tour with the Zoo's pandas
- National Cherry Blossom Festival 2015 VIP Parade Package
- One night in a family suite and breakfast for four at Great Wolf Lodge
- Two hours with a NASA aerospace engineer
- Hot-air balloon ride for two
- Breakfast for six with the Zoo's golden lion tamarins
- Paint with the great apes at the National Zoo
- Sailing course for two
- Behind-the-scenes tour with the Zoo's lions and tigersAnd much, much more!

# Low-cal options. No-cal options However-you-and-your-family-roll options.

There are people's tastes. And then there are people's taste buds. Satisfying both is why we offer such a wide range of low- and no-calorie options (180 in the U.S. alone), as well as portion-control packages, that can fit into a balanced diet and active lifestyle. Variety—it's just another thing we're doing to help make the world we all live in a little bit better. To learn more about what we're doing and why we're doing it, join us at **ComingTogether.com** 





# FONZ

# Birthday Bison!

The Zoo's newest exhibit—
American bison, sponsored
by Continental Building
Products—is scheduled to
open this summer. Here's a
sneak peek of what's to come.

### Two Bison

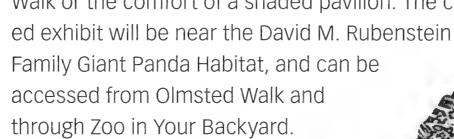
he Zoo began with bison, whose near brush with extinction motivated Smithsonian taxidermist William Hornaday to rally for funds and support to launch a zoo in D.C.

Bison were a fixture at the Zoo for many years until construction forced the closure of their exhibit in 2004. Now, after a ten-year absence, the Zoo is bringing bison back!

Two female bison—donated by the American Prairie Reserve—will arrive at the Zoo by summer. After a quarantine period, they will go on exhibit sometime this summer or fall.

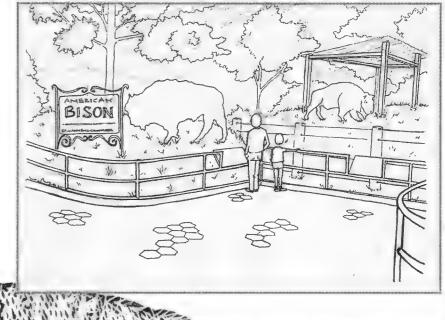
# One Beautiful Exhibit

The Zoo's two bison will have ready access to grass, trees, and shade in their new exhibit. Visitors will be able to observe the animals—North America's largest land mammal—from Olmsted Walk or the comfort of a shaded pavilion. The complet-











# Many People to Thank

This exhibit would not be possible without the generous support of sponsors, donors, and generous individuals like you. Thank you to all who have helped!

Continental Building Products is the lead exhibit sponsor.

The Smithsonian Women's Committee provided support for exhibit interpretation, including panels and interactive elements.

American Prairie Reserve donated the two bison to the Zoo.

Many FONZ members and Zoo visitors made individual donations to support the exhibit project. Thank you!

and you'll be invited to an exclusive donor exhibit-opening event! fonz.org/bison

# 125 Years of Stories to Tell

The bison exhibit represents just one of many stories the Zoo is sharing with visitors this year. By now, a whole series of new exhibit panels have been installed throughout the Zoo. From the Easter Monday Egg Roll that began on Lion/Tiger Hill to a reproduction of House Resolution 11810—the legislation that launched the Zoo—each panel offers a peek into the Zoo's 125-year history. See the map below for the approximate locations of the new exhibit panels.

Thank you to our panel sponsors, whose support helped make this project possible:

- ABC7/ NewsChannel 8
- Booz Allen Hamilton
- Capital One Bank
- The Coca-Cola Company
- GEICO
- Giant Food

- Greater Washington **Board of Trade**
- Hensel Phelps
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# ZooVIEW



# **Backlit Beauty**

# Give an avid photographer a new lens, and stunning photographs may be the result.

"I love the light in this shot," says FONZ Photo Club member Patrick Rogers, who was testing out his new camera lens during a visit to the Zoo. "I was walking through the bird exhibits when I saw this black-crowned night-heron in shady, beautiful light. I took several shots from different angles, but I like this one the best due to the colorful background."

The black-crowned night-herons are wild birds. They spend their winters farther south, and return to the Zoo every spring to nest in the trees near the Bird House. The herons can be seen at the Zoo from approximately April through September.

### **Technical Notes** —

CAMERA: CANON 5D MARK III; LENS: CANON 500MM F/4L IS

ISO: 1250; EXPOSURE: 1/250 SEC AT F/5.6

### **Submit Your Photos!**

Smithsonian Zoogoer welcomes FONZ members' submissions of photos taken at the Zoo. Please send photos to Zoogoer@si.edu. We will contact you if we are able to use your picture for the Zoo View page.

### Join the Club!

Membership in the FONZ Photo Club is open to photographers of all skill levels. The group meets monthly to hear guest speakers and to share and discuss members' work. Learn more at fonz.org/photoclub.



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